

## WHAT IS CLAIMED IS:

1. A pipe system structure comprising:
  - a pipe wall having an internal and an external surface;
  - 5 a reinforcement layer overlaying at least a portion of the internal or the external surface, the reinforcement layer comprising at least one fabric layer impregnated with resin; and
  - an adhesive material applied to the internal or the external surface or the reinforcement layer, for bonding the reinforcement layer to the pipe wall to develop a
  - 10 composite system between the pipe wall and the reinforcement layer.
2. The pipe system of claim 1, wherein the at least one fabric layer is partially or totally impregnated with resin.
- 15 3. The pipe system of claim 1, wherein the at least one fabric layer impregnated with resin is pre-formed in a plurality of sections and prepared outside of the pipe.
4. The pipe system of claim 3, wherein the pre-formed fabric layer impregnated with resin is pre-formed in a partially cured state.
- 20 5. The pipe system of claim 1, wherein the at least one fabric layer impregnated with resin is in substantially one section and in a partially cured state.
- 25 6. The pipe system of claim 5, wherein an internal device is used to hold the one section of the at least one fabric layer in place for improved bonding.
7. The pipe system of claim 1, wherein the adhesive material comprises a tack coat for holding the reinforcement layer to the pipe wall on contact.
- 30 8. The pipe system of claim 1, wherein the adhesive material comprises a wet primer coat and a tack coat.

9. The pipe system of claim 8, wherein the wet primer and the tack coat comprise, polyester, epoxy, vinylester, acrylic, modified acrylic, urethane, phenolic, polyimide, bismaleimide, or polyurea.
- 5 10. The pipe system of claim 1, wherein the reinforcement layer comprises a first plurality of high strength fibers extending substantially in a longitudinal direction, and a second plurality of high strength fibers extending substantially in a hoop direction, wherein a length of the pipe extends in the longitudinal direction and a circumference of the pipe extends in the hoop direction.
- 10 11. The pipe system of claim 10, wherein the first and second plurality of high strength fibers are selected from the group of materials including glass, polyaramid, boron, graphite, silica, quartz, carbon, ceramic, polyethylene, polyimide, liquid crystal polymers and polypropylene.
- 15 12. The pipe system of claim 1, wherein the reinforcement layer comprises a plurality of high strength fibers extending at an angle of substantially plus and minus 45 degrees with respect to a longitudinal axis of the pipe.
- 20 13. A method for reinforcing a wall of a pipe, the method comprising the steps of: applying a composite reinforcement layer so as to cover at least a portion of an internal or an external surface of the pipe wall, the composite reinforcement layer comprising at least one fabric layer comprised of fibers in a polymer matrix; and affixing the reinforcement layer to the internal or external surface.
- 25 ~~14.~~ The method of claim ~~13~~, wherein the composite reinforcing material is pre-formed.
- 30 ~~15.~~ The method of claim ~~13~~, wherein the step of affixing the reinforcement layer to the internal or the external surface comprises affixing the reinforcement layer to the internal or the external surface using a method selected from the group consisting of adhesives and fasteners.
16. The method of claim 15, further comprising the steps of:

Sub 7  
a2  
cont

accessing the internal surface of the pipe through an existing passageway; and  
cleaning the internal surface of the pipe of debris.

- 5 17. The method of claim 16, further comprising the step of drying the internal or  
internal surface of the pipe.

- 6 18. The method of claim 16, wherein the existing passageway comprises a  
manhole.

- Sub 7  
a3
- 10 19. The method of claim 13, further comprising the steps of:  
excavating the pipe to expose a portion of the external surface of the pipe; and  
cleaning the external surface of the pipe of debris.

- 4 20. The method of claim 19, wherein the step of affixing the reinforcement layer  
15 to the internal or external surface comprises affixing the reinforcement layer to the  
external surface using a scaffolding.